DOCUMENT RESUME

ED 040 728 LI 002 048

AUTHOR	Leimkuhler, Ferdinand F.; Cooper, Michael D.
TITLE	Cost Accounting and Analysis for University Libraries.
INSTITUTION	California Univ., Berkeley.
SPONS AGENCY	Ford Foundation, New York, N.Y.
PUB DATE	Jan 70
NOTE	47p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$2.45
DESCRIPTORS	*Cost Effectiveness, Libraries, *Library Expenditures, *Library Planning, *Library Programs

ABSTRACT

The approach to library planning studied in this report is the use of accounting models to measure library costs and implement program budgets. A cost-flow model for a university library is developed and listed with historical data from the Berkeley General Library. Various comparisons of an exploratory nature are made of the unit costs for different parts of the Berkeley system. (Author)

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COST ACCOUNTING AND ANALYSIS FOR UNIVERSITY LIBRARIES

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ERIC/CLIS
FEB 25'70
UNIVERSITY OF MINNESOTA

Paper P-2
January 1970

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PREFACE

This is one of a continuing series of reports of the Ford Foundation sponsored Research Program in University Administration at the University of California, Berkeley. The guiding purpose of this program is to undertake quantitative research which will assist university administrators and other individuals seriously concerned with the management of university systems both to understand the basic functions of their complex systems and to utilize effectively the tools of modern management in the allocation of educational resources.

This paper is a preliminary effort to develop a cost accounting model appropriate for program budgeting for library operations. The Berkeley General Library is used as a test case and, therefore, these results may not be completely general. However, some type of a cost accounting model is essential to the full implementation of program budgeting in a library system.

ABSTRACT

The approach to library planning studied in this report is the use of accounting models to measure library costs and implement program budgets. A cost-flow model for a university library is developed and tested with historical data from the Berkeley General Library. Various comparisons of an exploratory nature are made of the unit costs for different parts of the Berkeley system.

The authors acknowledge the generous assistance of Dr. James E. Skipper, University Librarian, for making available all necessary data for the cost analysis. Mrs. Helen M. Worden, Associate University Librarian, was especially helpful in clarifying many of the problems incurred in the analysis of the Berkeley library. Miss Coralia Serafim conducted the survey of branch librarians to determine branch direct labor acquisition cost. Dr. Robert M. Hayes and Dr. Patrick Wilson made valuable suggestions to preliminary drafts of this document.

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LIBRARY COST ACCOUNTING AND ANALYSIS

1. The Cost-Flow Accounting Model

There does not appear to be any uniform method by which libraries account for their internal costs. Considerable attention is given to the development of budgets along organizational lines and to the control of expenditures for labor and materials. But these data are not used to measure the cost of performing some function or rendering some service in the manner of industrial cost accounting. For example, in order to estimate the cost of holding a journal and to compare it with the cost of using a regional lending service, Williams [1968] had to develop his own basic data in four libraries by means of interviews and other sampling techniques. In his recent study of the M. I. T. Libraries, Shishko [1968] had to augment the existing data base considerably in order to estimate the cost of various library functions and programs.

A basic notion in the development of a cost control system is the idea of a "cost center" for which there is a clear definition of function and responsibility. The cost centers serve as focal points in the system for the collection and evaluation of cost data. There appear to be two major kinds of cost centers in libraries: processing centers and service centers. The processing centers serve an intermediate role in the flow of resources to the service centers, and all of their costs are passed on to the service units. The service centers can include branch libraries or specialized facilities within a central library. These units offer a

schedule of services to certain users at certain "prices" which together comprise the output of the library. A library program may be identified with a single service unit or may cut across several or all units. Shishko divided the mission of the M.I.T. libraries between research and instruction without subdividing it by subject area. In a branch library system, most branches would contribute to both research and instructional programs and their individual output would have to be divided under the two main headings, if this is desired. In accounting for costs and developing costs of service estimates it is important that these figures be related to a true decision-making function in the organization; that is, they should have a quality called "accountability." It is meaningless to develop numbers about which nothing can be done.

A simplified cost accounting plan for modelling the flow of cost through a library organization is shown in Figure 1. This plan incorporates the notion of standard cost as a measure of performance. The standard costs are based on the number of items processed, acquired, or held by the library unit. Other measures of performance could be used to gauge the flow of costs. These standards should be evaluated each year and modified accordingly so as to provide the best estimate of what is expected for the next year. "Variance" accounts can be used to collect the difference between what is expected and actually occurs, that is, between standard cost and "full" cost. This is a common and useful way to maintain control over costs and to generate management-by-exception reports. In Figure 1, only one variance account is shown for each category, but in practice one may develop separate variance measures for the amount and the unit cost of a flow. For example, if labor is costed at different wage rates for different kinds of labor hours used, it would be possible to maintain separate variance accounts for the wage rate and the labor hours to explain total

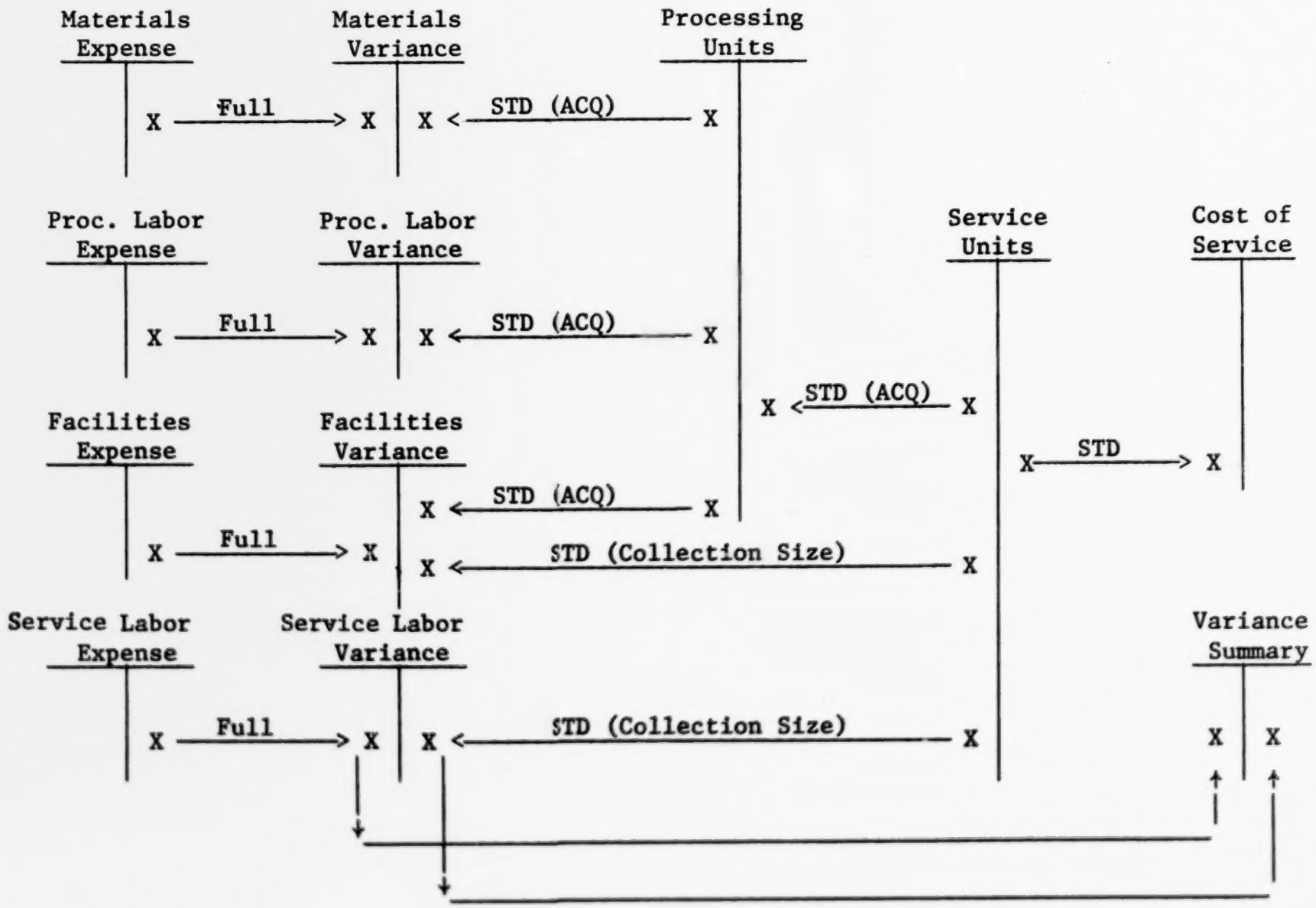

Figure 1: Flow of Library Costs in a Simplified Standard Cost Accounting Plan

labor variance. Standard costing assumes that the cost is directly proportional to the basis for unit cost; however, routine corrections can made to account for any predictable bias from the variance figures.

2. A Cost Model of the Berkeley Libraries

The cost accounting plan in Figure 1 was applied to the Libraries of the University of California at Berkeley in order to show how costs are generated and flow through the system to the various branch and special libraries. The resulting simplified cost model of the Berkeley Libraries is shown in Figure 2. No variance accounts are included in this model, since it is based on the cost history of a single year, however variance accounts and standard costing could be introduced into the model. The model conforms closely to the organizational structure of the Berkeley Libraries except in the case of the Serials and Documents Department, where a division had to be made between their function as a central processing unit and their function as a special service unit for readers. A similar division was made at the branch libraries to separate the cost of selecting and accessioning new items from the cost of maintaining and providing service from the shelved collection.

The main kinds of costs in the model are the direct costs for materials and labor and the indirect costs for space and overhead. The costs of space and university overhead do not enter into the ordinary budget estimates of operating costs, but they are important parts of the total cost of operating libraries and cannot be ignored. All space for the libraries was costed at the same unit price, except for the depository space; and the university overhead was applied at a uniform rate. This permitted the development of a total labor, space, and overhead figure for each organizational unit of the library.

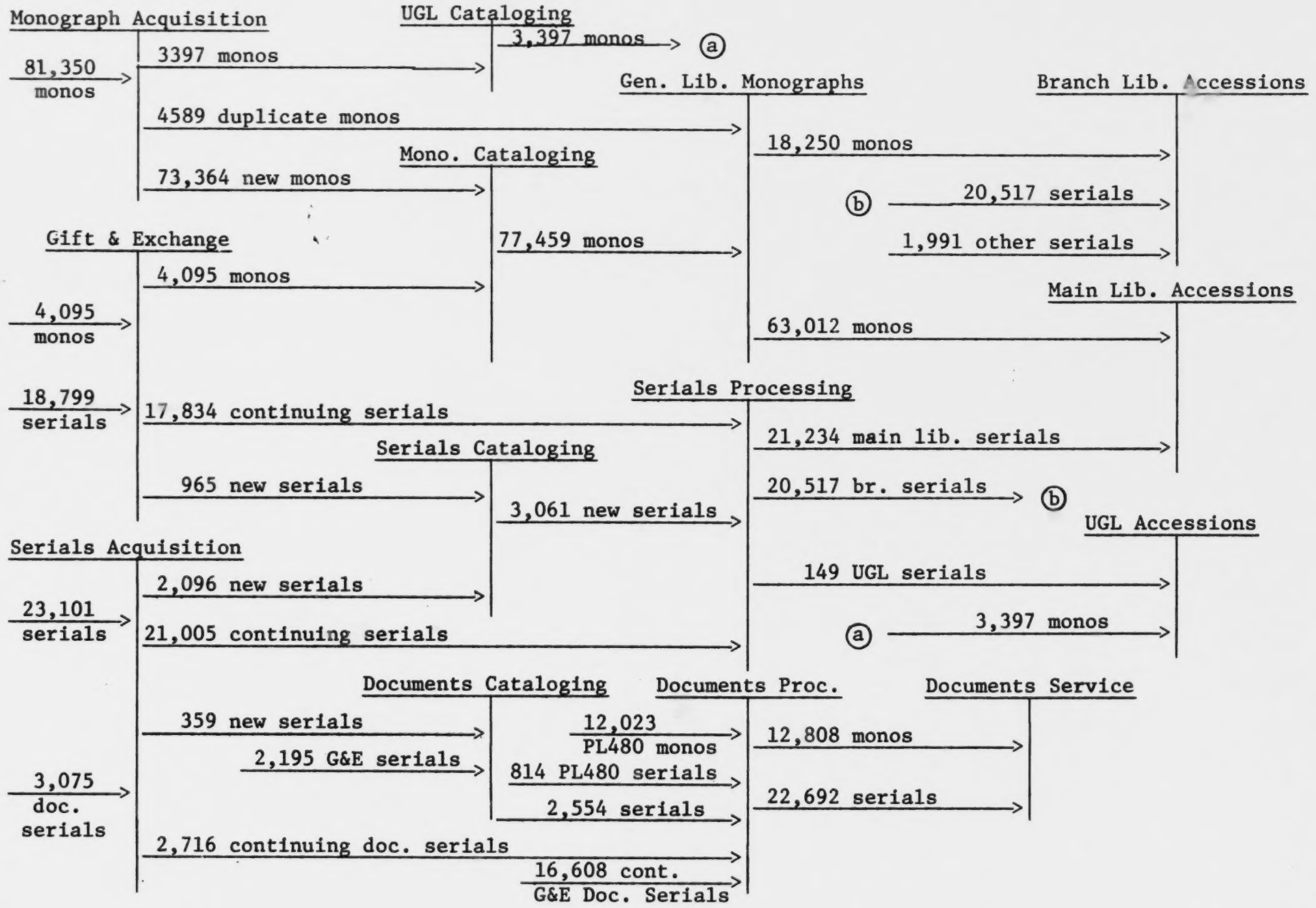

Figure 2: Items Processed

The main distinction in the flow of materials is between monographs and serials, and between purchased items and gift and exchange items, although the latter distinction is dropped after acquisition processing. For serials, a distinction is maintained between new items and continuing items because of the difference in cataloging treatment. Documents and monographs for the new Undergraduate Library are cataloged separately from regular monographs and serials, and separate material flows are used for these items. The total number of items and their distribution through the system are based on data from the annual reports of the Berkeley Libraries for the year 1967-68, although in some instances it was necessary to develop estimates from the Libraries' files of orders.

3. Direct Costs: Materials

Materials costs for the Berkeley library are limited to two classes of items: monographs and serials. Any type of library material for which a standing order can be placed is considered a serial.

Through the budgeting process, each branch library is allocated money for purchase of monographs. For each branch, a branch fund is maintained from which all disbursements are made. For the Main Library a number of funds are used for purchasing monographs. These include Area funds, Subject funds and Miscellaneous funds. In all, more than 150 funds are used for materials purchasing for the General Library.

Each order placed for a paid monograph is represented as a card in the Acquisition Department Accounts Division order file. This file was examined to determine the number of paid monographs acquired by all General Library units for the period 1 July 1967 to 30 June 1968.

To arrive at the total number of new monographs purchased by

branches for the fiscal year it is necessary to allocate certain funds to service units. This is true for the reappropriations, department orders and donations.

University fund accounting procedures require that all orders outstanding at the end of the fiscal year be "cancelled" and that the funds required to purchase these items be reappropriated at the beginning of the next fiscal year. All cards for orders which have been placed but not received are transferred to one reappropriations fund, and subsequently paid out of that fund. Since all items purchased out of this fund are no longer classified by originating fund, it is difficult to determine the branch that ordered the item without taking a sample of the more than eight thousand orders in the fund.

Instead of sampling, the items in the reappropriations file as well as the departmental orders ,reserve duplicates and donation funds were allocated to each branch and Main Library fund on a percentage basis of total expenditure for monograph items by that branch.

To expedite the ordering procedure for certain items purchased on the Main Library Area funds, a simplified ordering system (S.O.S.) has been developed. S.O.S. orders are not represented in the primary order file. Statistics are recorded on the number of S.O.S. orders placed but not the number of S.O.S. items actually received. A 100% sample was made of invoices from the dealer supplying the largest amount of S.O.S. material, and a dealer supplying a close to the average number of items per dealer. The results indicated that the number of items received was within ten percent of the number of orders placed.Using these results as a basis, the number of simplified orders was assumed to represent the actual number of items received.

Each order for a monograph may call for the receipt of one or more volumes. A random sampling procedure was undertaken to determine the number of volumes per order. Eighteen hundred orders from 13 funds were examined. From this data, the number of volumes per order was determined to be 1.20. Certain funds such as those used to buy back sets and serials, and duplicate copies of high usage monographs had significantly different ratios - 2.20 for both. For these funds the latter factor was used.

Table 1 summarizes the number of monographs acquired during 1967/1968. Expenditure by fund was obtained from the annual financial report of the University Librarian. The average price per monograph for the General Library was $7.44, for a total of 81,350 items acquired. The number of items acquired by the branches was 21% of the total, while expenditures were 20% of the total ($605,588).

A second category of materials that enter into the library system is serials. Serials are accounted for in two ways. The costs for the first year in which the branch library initiates a serial order are charged to the branch fund. This is the same fund that is used to purchase monographs. The financial burden for the second and subsequent years in which the order is maintained is transferred to the Current Serials fund. Nearly all serials for all branches are paid out of this fund.

To determine the average price per paid serial for the libraries, a sample of the Acquisition Department Current Serials Division order file of 25,450 cards was taken. Of the 1378 orders (5.4%) examined, 975 (3.8%) were found to be related to items received and paid for in the 1967/68 fiscal year. The results of the sample are shown in Table 2. The average price of a serial received by a branch library was $27.23

TABLE 1: MONOGRAPH ACQUISITIONS
1967/1968

Branch	Number of New Monographs Purchased (Volumes) (1)	Purchase Expenditure ($)	Unit Price
Agriculture	790	5,879	7.44
Art/Anthropology	812	5,217	6.42
Astronomy/Math/Stat	390	3,550	9.10
Biochemistry	72	930	12.92
Biology	658	6,358	9.66
Chemistry	181	2,373	13.11
Earth Sciences	489	4,065	8.31
East Asiatic	4,665	21,620	4.63
Education/Psychology	1,841	9,878	5.37
Engineering	713	8,670	12.16
Environmental Design	1,564	11,925	7.62
Forestry	272	2,706	9.95
Graduate Social Sciences	1,468	9,607	6.54
Library School	465	1,857	3.99
Music	1,258	11,922	9.48
Optometry	195	1,716	8.80
Physics	313	3,284	10.49
Public Health	976	7,522	7.71
Social Welfare/Crim	425	2,347	5.52
Branch Total	17,328	121,426	7.01
Main Total	64,022	484,162	7.56
Total	81,350	605,588	7.44

(1) Includes Reappropriations, Departmental Orders Catalogued for General Library, and Donations

TABLE 2 : SAMPLE OF CURRENT SERIALS
1967/1968

Branch	Number of Items in Sample	Cost of Items Sampled ($)	Sample Cost/Serial
Agriculture	48	2,682	55.88(1)
Art/Anthropology	13	96	7.38
Astronomy/Math/Stat	15	309	20.60
Biochemistry	9	231	25.67
Biology	76	2,848	37.47(2)
Chemistry	22	535	24.32
Earth Sciences	9	85	9.44
East Asiatic	28	455	16.25
Education/Psychology	40	351	8.78
Engineering	55	2,118	38.51
Environmental Design	28	1,376	49.14
Forestry	14	188	13.43
Graduate Social Sciences	32	360	11.25
Library School	22	374	23.38
Music	14	171	12.21
Optometry	2	12	6.00
Physics	13	259	19.92
Public Health	26	441	16.96
Social Welfare/Crim	10	71	7.10
Branch Total	476	12,962	27.23
Other General Library Units	499	6,550	13.13
Total General Library	975	19,512	20.01

(1) Includes one $2,000 Item

(2) Includes one $1,250 Item

while all other General Library units averaged $13.13 per serial. The overall average price per serial was $20.01.

Williams [1968] reports that for the four university libraries he sampled, the subscription price per title per year were $12.62, $22.62, $21.55, and $17.06.

In addition to paid serials representing 54% of the total received, more than 19,000 serials are received through gift and exchange operations. Table 3 shows the distribution of all serial items across branches.

4. Direct Costs: Labor

Aside from materials cost, the second component of direct costs is labor. The Berkeley library divides the labor force into three classes: Professional, Non-Professional, and General Assistance. Almost all student employees are hired in the General Assistance category. Mean salary rates per year for each category are shown in Table 4. The non-professional category includes the "Library Assistant" job titles as well as Secretary, Bookmender, Editor, etc.

Organization charts for the library, in conjunction with published salary schedules were used to calculate the direct labor cost per branch and main library unit. (See Tables 5 and 6). To the extent that the organization charts do not reflect the true staffing situation, and to the extent that the mean salary figures do not represent the true salaries, the data in Tables 5 and 6 are biased.

Total direct labor expenditure amounts to $3.6 million, and of this, 22% is branch labor. Of the 120 F.T.E. in the branches, 31% are Professional, 39% are Non-Professional, and 30% are General Assistance. The 443 F.T.E. for the Main Library is made up of 22% Professionals, 49% Non-Professionals, and 29% General Assistance.

TABLE 3: SIZE OF THE GENERAL LIBRARY
June 30, 1968

Branch	Volumes	Current Serials	Total Items (2)	Ratio of Volumes to Serials
Agriculture	63,799	2,437	66,236	26.18
Art/Anthropology	27,024	1,158	28,182	23.34
Astronomy/Math/Stat	24,574	827	25,401	29.71
Biochemistry	5,427	140	5,567	38.76
Biology	144,090	3,221	147,311	44.73
Chemistry	18,342	335	18,677	54.75
Earth Sciences	42,199	977	43,176	43.19
East Asiatic	241,811	1,237	243,048	19.55
Education/Psychology	65,455	1,385	66,840	47.26
Engineering	63,162	1,638	64,800	38.56
Entomology	8,579	246	8,825	34.87
Environmental Design	50,728	1,293	52,021	39.23
Forestry	20,281	1,334	21,615	15.20
Graduate Social Sciences	39,014	2,616	41,630	14.91
Library School	25,520	2,014	27,534	12.67
Music	70,360	197	70,557	357.16
Optometry	2,872	82	2,954	35.02
Physics	15,276	190	15,466	80.40
Public Health	41,111	906	42,017	45.38
Social Welfare/Crim	12,857	275	13,132	46.75
Branch Total	982,481	22,508	1,004,989	43.65
Main Building	2,200,562	44,075 (1)	2,244,637	49.93
Total General Library	3,183,043	66,583	3,249,626	47.81

(1) Includes 22,692 Documents

(2) A serial title is considered as an item.

TABLE 4: SALARY SCHEDULE

Title	1967/1968 Mean Salary ($) Per Year
Professional	
Librarian I	7,075
Librarian II	8,450
Librarian III	9,975
Librarian IV	11,575
Librarian V	13,725
Non Professional	
Library Assistant I	5,250
Library Assistant II	6,078
Library Assistant III	7,044
General Assistance	
Clerk	4,650

TABLE 5: LABOR COSTS--MAIN LIBRARY
1967/1968

Unit	Total FTE	Total Direct Salary Expenditure ($)
Acquisitions Dept.	66.75	481,763
Bancroft	29.95	213,696
Business Office	17.375	105,742
Catalog Dept.	76.75	500,420
Documents Dept.	26.045	162,584
General Reference Service	17.25	128,369
ICLF(N)	3.50	16,875
Librarians Office	6.75	83,891 (1)
Library Personnel Office	3.375	23,470
Library Photo Service	23.50	141,285
Loan Dept.	88.125	464,667
Mark Twain	1.00	12,078
Morrison	3.745	20,708
Rare Books	4.125	23,581
Serials Dept.	69.125	381,007
Storage Selection	1.25	5,813
Undergraduate Library Selection Project	4.50	32,906
Total	443.115	2,798,855

(1) Estimated

TABLE 6: LABOR COSTS--BRANCH LIBRARIES
1967/1968

Branch	Total FTE	Total Direct Salary Expenditure ($)
Agriculture	4.805	33,009
Art/Anthropology	4.045	24,387
Astronomy/Math/Stat	3.94	23,783
Biochemistry	.512	4,014
Biology	14.225	81,617
Chemistry	3.08	19,276
Earth Sciences	3.08	20,104
East Asiatic	18.875	153,834
Education/Psychology	13.50	84,532
Engineering	5.875	35,498
Entomology	1.52	9,947
Environmental Design	8.08	54,376
Forestry	4.97	37,436
Graduate Social Sciences	11.69	77,415
Library School	2.75	17,679
Music	6.375	44,096
Optometry	1.03	6,897
Physics	3.58	23,958
Public Health	5.64	36,149
Social Welfare	3.20	17,439
Branch Total	120.772	805,426
Main Total	443.115	2,798,855
Total	563.887	3,604,281

5. Indirect Costs; Overhead and Space

The cost of library building space is estimated to be about $5 per sq. ft. per year. This figure is intended to represent current replacement value of the building space including equipment and fixtures and the cost of utilities and maintenance. The simplified method used to make this estimate is shown below. The numbers used were obtained from the studies by Shishko [1968] and Williams [1968], and from consultation with the Berkeley and University Architects Offices, the Berkeley Grounds and Building Office, and the University Real Estate Office. These numbers, however, are not to be considered as official or certified figures in any sense; but only as representative cost figures for the purpose of analysis.

Cost of on-campus or nearby real estate	$ 12.00 per gross sq. ft.
Total building construction project cost	38.00 per gross sq. ft.
Total building and site cost	$ 50.00 per gross sq. ft.
Assignable space factor with 80% utilization	1. 25
Effective cost of assignable space	$ 62.50 per sq. ft.
Cost of fixtures, furniture, shelving,etc.	4.00 per sq. ft.
Total initial cost of space and furnishings	$ 66.50 per sq. ft.
Capital recovery factor	0.06
Equivalent annual cost of space and furnishings	$ 3.99 per sq. ft. per yr.
Annual cost of utilities and maintenance	1.00 per sq. ft. per yr.
Total annual cost for library building space	$ 4.99 per sq. ft. per yr.

The annual cost for the Richmond Inter-Campus Library Facility ICLF(N) is estimated to be about $2.50 per sq. ft. per year to cover the cost of purchase, remodeling, equipment, utilities, and maintenance.

Tables 7 and 8 summarize the space costs for the General Library.

In addition to direct labor costs,the library incurs expenses for fringe benefits and salary administrative overhead for its employees. Discussions with the University Office of the Vice President for Planning and Analysis indicated that administrative overhead is approximately ten percent of direct labor cost. Salary administrative overhead ranges between nine and thirteen percent of direct labor, depending on job title. This study assumed that administrative overhead was 10%. Thus fringe benefits plus administration total 20%.

Within the library itself, the costs of the Librarians Office, the Business Office, the Personnel Office and the space used by these departments were considered as part of the library overhead charge. In addition, supplies and expense as well as equipment and fixtures were included in the overhead charge and allocated to library units on a salary basis. The overhead charges for these departments and items amounted to 21%. The total overhead charge for library units was 41% (20% + 21%).

6. Processing Cost Centers : Acquisition and Cataloging Costs

As materials are introduced into the processing centers of the library, they undergo transformations which ultimately result in items ready for circulation. Figure 3 shows the flow of items through the processing centers. The monographs and/or serials enter at each processing center. To these " raw materials " is added a labor,space, and overhead charge. Thus as a unit passes out of the processing center a value is added corresponding to the cost of processing the item.

For purposes of the model, monographs are considered to be acquired from two sources: purchases and gifts. Purchased monographs

TABLE 7: SPACE COSTS--MAIN LIBRARY

Unit	Total Assignable Square Feet 1967/1968	Total Annual Cost at $5.00/ Square Foot
Acquisition Dept.	13,793	68,965
Bancroft	25,072	125,360
Business Office	4,358	21,790
Catalog Dept.	6,375	31,875
Catalogs (Public)	9,899	49,495
Documents Dept.	27,799	138,995
General Reference Service	2,810	14,050
Humanities Grad.	5,030	25,150
Interlibrary Borrowing Service	256	1,280
Librarians Office	1,566	7,830
Library Photo Service	4,665	23,325
Loan Dept.	86,023	430,115
Map Room	3,265	16,325
Mark Twain	428	2,140
Morrison	5,487	27,435
Personnel	447	2,235
Rare Books	6,099	30,495
Reading Rooms	16,748	83,740
Reserve Book Dept.	9,848	49,240
Serials Dept.	31,440	157,200
Undergrad. Library Project	4,791	23,955
Total	266,199	1,330,995

TABLE 8: SPACE COSTS--BRANCH LIBRARIES

Branch	Total Assignable Square Feet 1967/1968	Total Annual Cost at $5.00/ Square Foot
Agriculture	7,746	38,730
Art/Anthropology	5,307	26,535
Astronomy/Math/Stat	4,009	20,045
Biochemistry	1,503	7,515
Biology	21,480	107,400
Chemistry	11,025	55,125
Earth Sciences	5,782	28,910
East Asiatic	13,698	68,490
Education/Psychology	13,308	66,540
Engineering	6,125	30,625
Entomology	1,796	8,980
Environmental Design	14,522	72,610
Forestry	5,319	26,595
Graduate Social Sciences	23,713	118,565
Library School	3,321	16,605
Music	8,858	44,290
Optometry	1,014	5,070
Physics	4,833	24,165
Public Health	7,873	39,365
Social Welfare	4,205	21,025
Total Branch Libraries	165,437	827,185
Total Main Library	266,199	1,330,995
ICLF(N) (1)	55,840	139,600 (2)
Total	487,469	2,297,780

(1) Inter-Campus Library Facility (North). Depository.
(2) Total Annual Cost of $2.50/Square Foot.

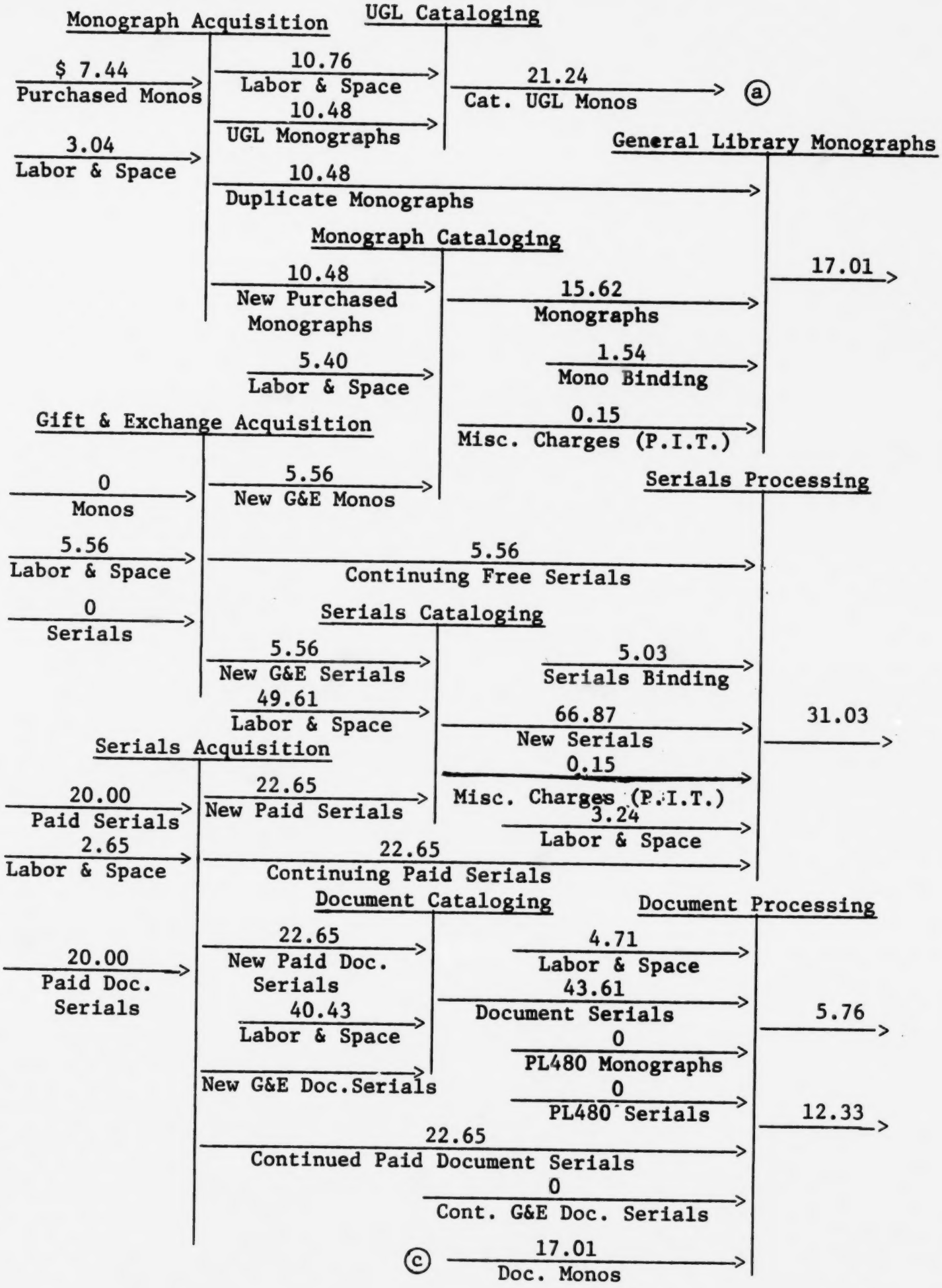

Figure 3: Unit Costs

Part 1

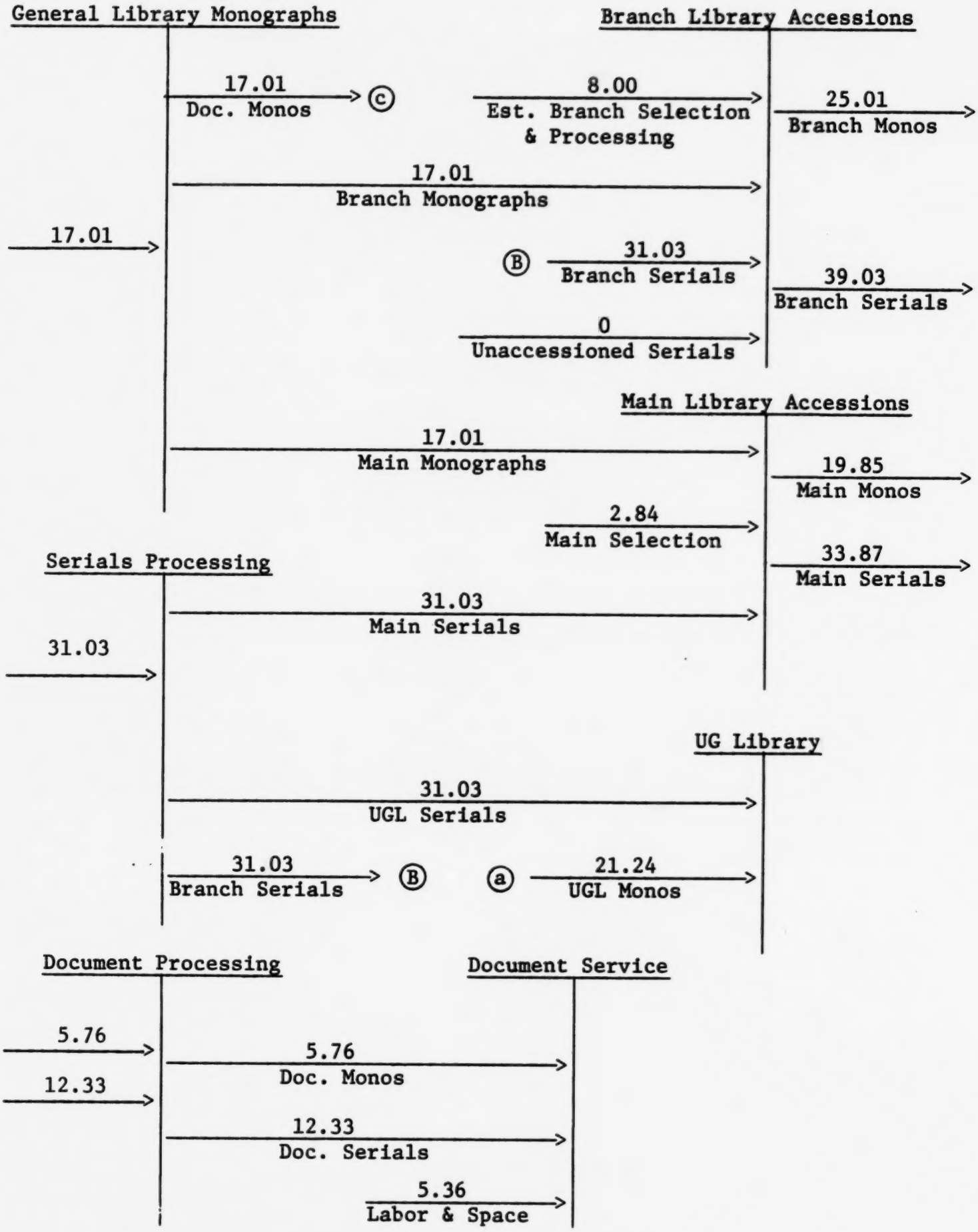

Figure 3: Unit Costs--Cont.

enter the system at a cost of $7.44 per item. Gift monographs enter at zero cost per item. To the direct material cost is added a labor and space charge of $3.04 per item. The $3.04 is the cost for the Administrative and Processing Divisions of the Acquisitions Department, plus a 63% overhead rate; 21% university and library overhead plus 42% Acquisitions department overhead (department management, Search Division, and Department Order Division).

New monographs enter the cataloging department from the Gifts division and the normal acquisition ordering procedure. Once in the cataloging department, a labor, space and overhead charge of $5.40 per monograph is added. Binding, selection and other miscellaneous charges are also added.

A monograph acquired by a branch has a final cost of $25, while a monograph acquired by the main library costs $19.85.

Similar flows can be observed in Figure 3 for serials and documents. A paid serial has an initial subscription cost of $20. After cataloging for a new serial and processing (check in/entering) for all serials, the branch cost is raised to $39.03 and the main library cost becomes $33.87. Were it not for the large number of gift serials, (nearly 50% of the total), the cost per serial title might easily double.

The account "General Library Monographs" serves as a clearing account for the addition of binding charges as well as postage, insurance, and taxes (P.I.T.) on acquisitions. Binding charges are made up of the cost to operate the bindery, the Bindery Preparation Division and the Binding Pickup Department. Including space and overhead charges this amounts to $337,197 for 55,880 items bound (excluding mending).

When the total expenditure is divided between monographs and serials in the ratio 20,899 to 34,981 (1 to 1.67) and the resulting cost divided by the total monograph and serial items processed, a cost of $1.54 per monograph and $5.03 per serial results. These amounts represent proportional charges for future binding that a processed item incurs.

In addition to binding and postage charges, a serial entering the " Serials Processing " account has added to it a charge reflecting its check-in cost. This amounts to $3.24 per serial title per year.

7. Service Cost Centers: Main Library and Branch Libraries Costs

Once the labor and space costs have been established for the processing functions, it is then possible to determine the service costs and then total library costs. Tables 9 and 10 summarize the total library cost for the system. Out of a total of $8.3 million, $3.7 million (46%) is spent in the process of acquisition of materials. And of this only $1.2 million (14%) is for the purchase of raw materials, i.e., monographs and serials.

Total acquisition cost of $3.7 million has three components: materials cost, labor cost and space cost. Materials are either monographs or serials, and enter the system at a unit price of $7.44 and $20.00 respectively. Gift items enter at zero cost. Acquisition labor cost includes the cost of all units involved in processing the items, i.e., Acquisitions processing, Cataloging, Serials processing, Documents processing and branch processing. The space cost is that associated with each of the processing units.

Branch labor acquisition cost was determined by means of interviews with each branch librarian. The librarian was asked to indicate what percentage of time each employee spent in the acquisitions process. This

TABLE 9 TOTAL LIBRARY COST--BRANCH LIBRARIES
1967/1968

Branch	Service Labor Cost	Service Space Cost	Total Acquisition Cost	Total Library Cost
Agriculture	21,372	37,749	115,916	175,037
Art/Anthropology	18,886	25,931	66,572	111,389
Astronomy/Math/Stat	23,938	19,674	42,553	86,165
Biochemistry	3,997	7,450	7,364	18,811
Biology	84,942	106,226	143,041	334,209
Chemistry	23,129	54,967	17,850	95,946
Earth Sciences	16,859	28,462	51,007	96,328
East Asiatic	171,330	66,714	165,330	403,374
Education/Psychology	93,595	65,543	102,532	261,670
Engineering	31,657	29,908	82,706	144,271
Entomology	12,131	8,906	9,601	30,638
Environmental Design	53,969	71,728	91,641	217,338
Forestry	40,311	26,109	59,216	125,636
Graduate Social Sciences	77,108	117,313	140,752	335,173
Library School	5,646	15,854	90,856	112,356
Music	50,456	43,833	70,476	164,765
Optometry	7,515	4,984	8,325	20,824
Physics	29,777	24,009	15,666	69,452
Public Health	36,078	38,785	61,061	135,924
Social Welfare	19,022	20,808	21,934	61,764
Branch Total	821,718	814,953	1,364,399	3,001,070
Main Total	1,618,531	1,282,612	2,425,481	5,326,624
Total	2,440,249	2,097,565	3,789,880	8,327,694

TABLE 10: TOTAL LIBRARY COST--MAIN LIBRARY
1967/1968

Unit	Service Labor Cost	Service Space Cost	Total Materials Acquisition Cost	Total Library Cost
Central Collection				
Loan Dept.	435,940	430,115		
Public Catalog		49,495		
Reading Rooms		83,740		
Reference	181,000	14,050		
Reserve Book Room	196,224	49,240		
Humanities Grad. Service	23,045	25,150		
Bancroft	301,310	125,360		
Rare Books	33,249	30,495		
Mark Twain	17,030	2,140		
Morrison	29,198	27,435		
Serials	49,425	43,482		
Newspapers	48,799	95,870		
Undergrad. Library Project			76,783	
Documents	61,469	128,790	353,586	
Maps	10,640	16,325		
Library Photo Service	199,212	23,325		
ICLF(N)	23,794	137,600		
Storage Selection	8,196			
Sub Total	1,618,531	1,282,612	430,369	
Main Library Excl. UGL & Docs. Acq. Cost			1,995,112	
Total	1,618,531	1,282,612	2,425,481	5,326,624

time was intended to reflect the cost of selection of materials, typing of orders and other associated tasks. The cost of branch processing of items (cataloging, filing, etc.) was estimated from a survey of three branch libraries.

Service labor and service space costs reflect the cost of providing services to the patron. This is in distinction to the total acquisition cost which reflects the cost of obtaining and processing raw materials.

8. Comparison of the Costs of Circulation, Holding and Acquisition

Several measures have been selected for use in evaluating the performance of the library and aiding in planning and analysis. If the total cost for the branch service operations is divided by the total number of items held, a measure of the holding and acquisition cost per item is obtained. Figure 4 plots this relationship for the branch libraries. The plot exhibits a declining cost per item held as the number of items held by the library increases. Evidently some economies of scale are present. The smallest branch library, Optometry, has the second highest cost among all branches ($7.05). The Graduate Social Science Library has the highest cost per item held, but this can be accounted for by the large amount of unused stack capacity of the library. The largest branch library(not shown on graph) East Asiatic, has the lowest cost per item held ($1.66).

Branch libraries average $2.99 while the main library averages $2.37 per item held. The overall average holding cost per item is $2.56.

The total cost per unit of circulation is plotted for branch libraries in Figure 5. Each data point represents the total cost of the branch service center divided by the total circulation for that

KEY

Figures 4 - 11

Agriculture	AG
Art / Anthropology	A/A
Astronomy / Math / Statistics	AMS
Biochemistry	BIOCHEM
Biology	BIOL
Chemistry	CHEM
Earth Sciences	ES
East Asiatic	EAL
Education / Psychology	E/P
Engineering	ENG
Entomology	ENT
Environmental Design	ED
Forestry	FOR
Graduate Social Sciences	GSSL
Library School	LSL
Music	MUS
Optometry	OPT
Physics	PHY
Public Health	PH
Social Welfare	SW

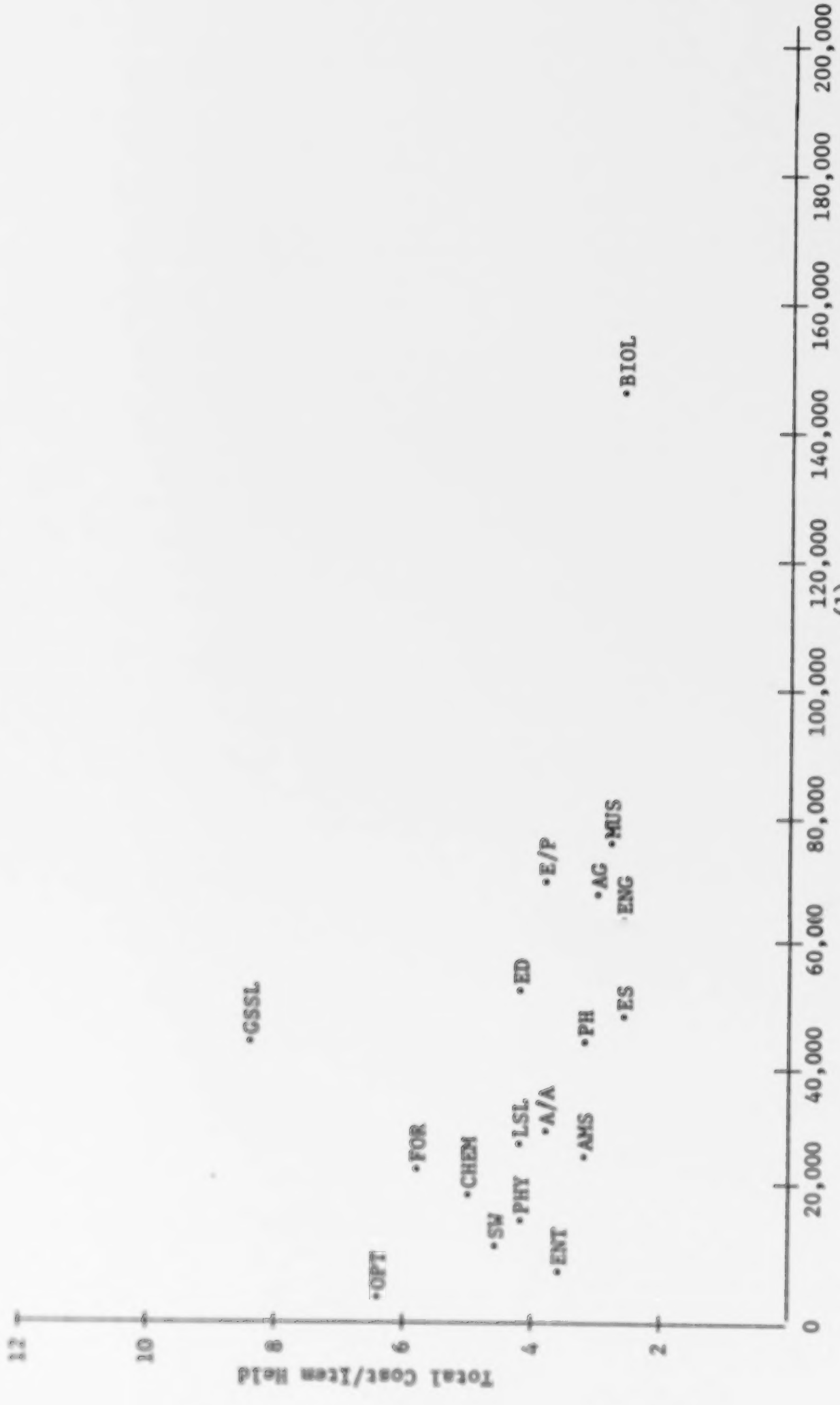

Figure 4: Total Cost Per Item Held

(1) Total items are defined in Table 3 Column 3.

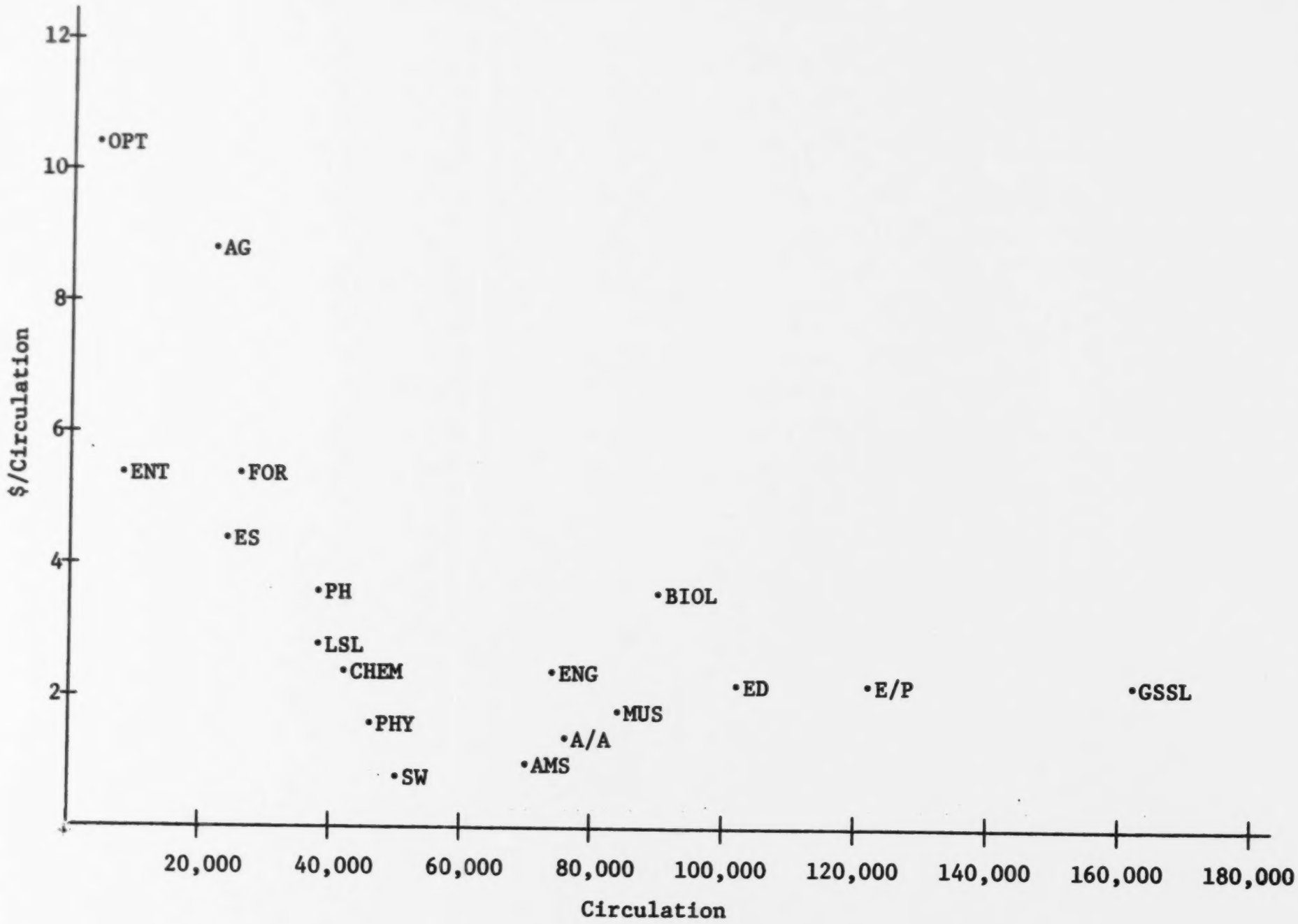

Figure 5: Total Cost Per Unit of Circulation

branch. The average cost per unit of circulation is $3.53 for the General Library. Main library cost is $4.16 per item while branch cost is $2.77.

The minimum cost per unit of circulation is reached for branches having 50,000 to 70,000 circulations per year. The highest cost per unit of circulation is recorded for the branch library having the smallest circulation. The branch library with the highest circulation, the Graduate Social Sciences Library, has a cost of $2.07 per unit of circulation as compared to the $2.77 average branch cost.

The total cost per dollar of acquisition for the General Library averages $2.20. While small branches (Social Welfare, Entomology, Physics and Chemistry) exhibit a much higher than average cost per dollar of acquisition, the cost for the remaining branch libraries seems to stabilize in the $1.20 to $2.70 range. Figure 6 exhibits these relationships.

Total cost per dollar of acquisition is calculated as the total library cost by branch divided by the total acquisition cost for that branch. A lower cost per dollar of acquisition reflects the fact that more money is being put into materials than labor or space. Figure 6 shows that the Library School Library is relatively material intensive in resource allocation. The Chemistry library, on the other hand, spends a small amount of money on acquisitions relative to labor and space.

Table 11 summarizes the circulation, acquisition and holding costs.

9. Comparisons of Labor,and Space Costs

Nearly $3.6 million out of $8.3 million was spent for direct labor in the General Library in 1967/1968. Since this constitutes a relatively large expenditure, it is important to try to develop tools for detecting significant changes in staffing needs.

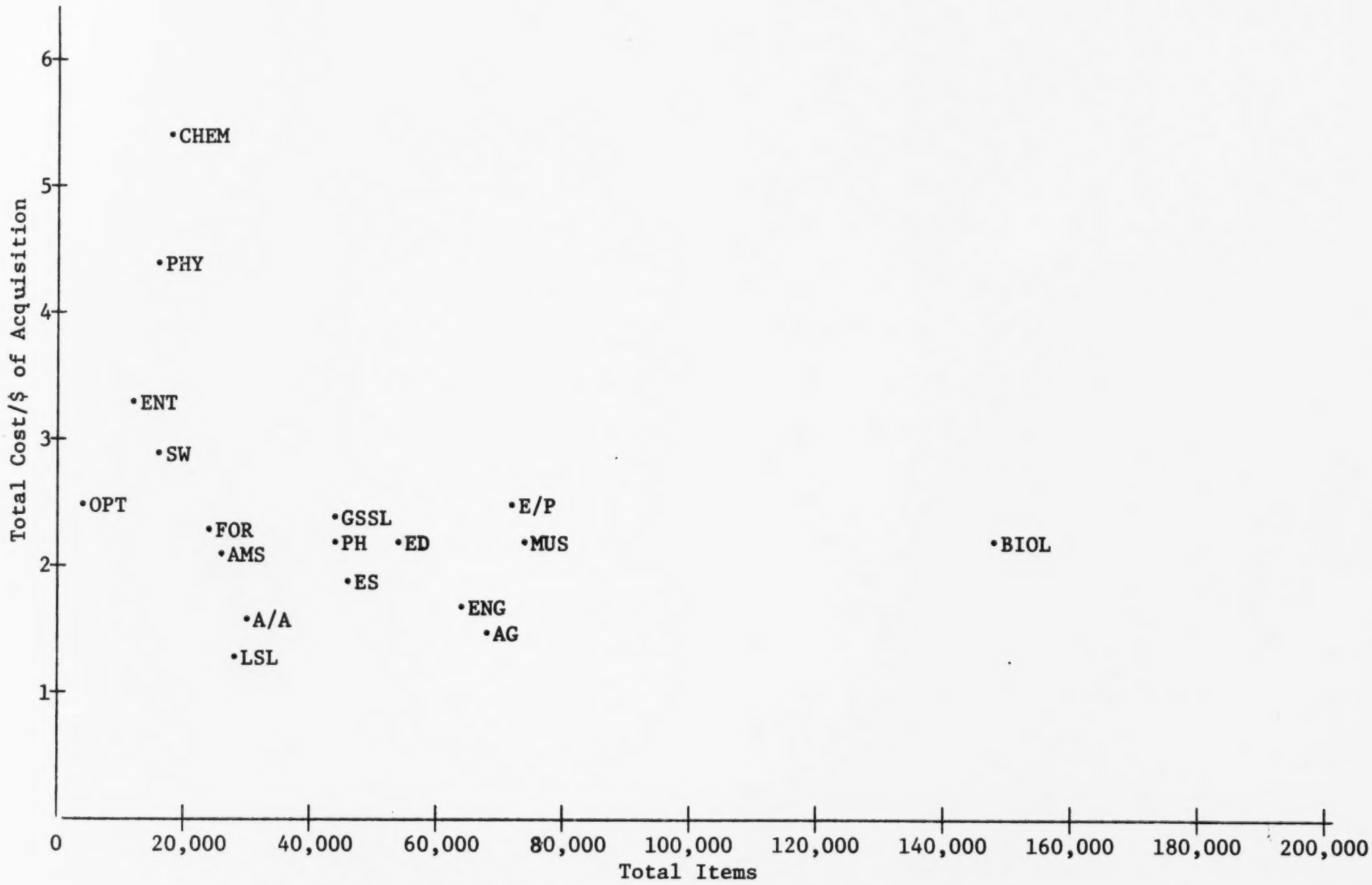

Figure 6 ; Total Cost Per Dollar of Acquisition

TABLE 11: TOTAL COST COMPARISONS
1967/1968

Branch	Total Cost/ Unit of Circulation	Total Cost/ Dollar of Acquisition	Total Cost/ Item Held
Agriculture	8.64	1.51	2.64
Art/Anthropology	1.47	1.67	3.95
Astronomy/Math/Stat	1.25	2.02	3.39
Biochemistry	NA	2.55	3.38
Biology	3.78	2.34	2.27
Chemistry	2.33	5.38	5.14
Earth Sciences	4.37	1.89	2.23
East Asiatic	NA	2.44	1.66
Education/Psychology	2.17	2.55	3.91
Engineering	2.04	1.74	2.23
Entomology	5.47	3.19	3.47
Environmental Design	2.14	2.37	4.18
Forestry	5.41	2.12	5.81
Graduate Social Sciences	2.07	2.38	8.05
Library School	2.81	1.24	4.08
Music	1.99	2.34	2.34
Optometry	10.61	2.50	7.05
Physics	1.52	4.43	4.49
Public Health	3.45	2.23	3.23
Social Welfare	1.21	2.82	4.70
Branch Total	2.77	2.20	2.99
Main Total	4.16	2.20	2.37
Total	3.53	2.20	2.56

The relation between F.T.E. and the number of volumes held is presented in Figure 7 .As the number of volumes held increases, F.T.E. staff increases. This relationship may be due to the manner in which staff is allocated to the branches.

When F.T.E. and circulation by branch are compared (Figure 8) the same increasing pattern emerges. If a least squares regression line were fitted to the data of Figure 7 . it would seem that the Graduate Social Sciences Library and the Education/Psychology library have an excess of staff for the number of volumes held. However, this analysis should be made in conjunction with the data in Figure 8 .. The F.T.E.-Circulation plot of Figure 8 appears to indicate that the Graduate Social Sciences and Education/Psychology library fall in line with the staffing-circulation relationships of the other branches.

Interviews with the Art/Anthropology and Astronomy/Mathematics/Statistics librarians have indicated a shortage in F.T.E. for the amount of circulation of their respective branches. This seems to be confirmed by Figure 8 . In addition, the graph indicates that Agriculture, Biology and Forestry are overstaffed for the amount of circulation.

Figure 9 explores the possibility that circulation may have a closer relation to non-professional and general assistance F.T.E. than to total F.T.E. In this graph it again seems clear that Art/Anthropology and Astronomy/Mathematics/Statistics are understaffed. But now the only library that appears overstaffed is Biology.

The storage of materials constitutes a second area in which planning and control must be exercised. Since facilities cannot be constructed in short periods of time, management must be in a position to predict when a branch will no longer be able to store all the items it would like.

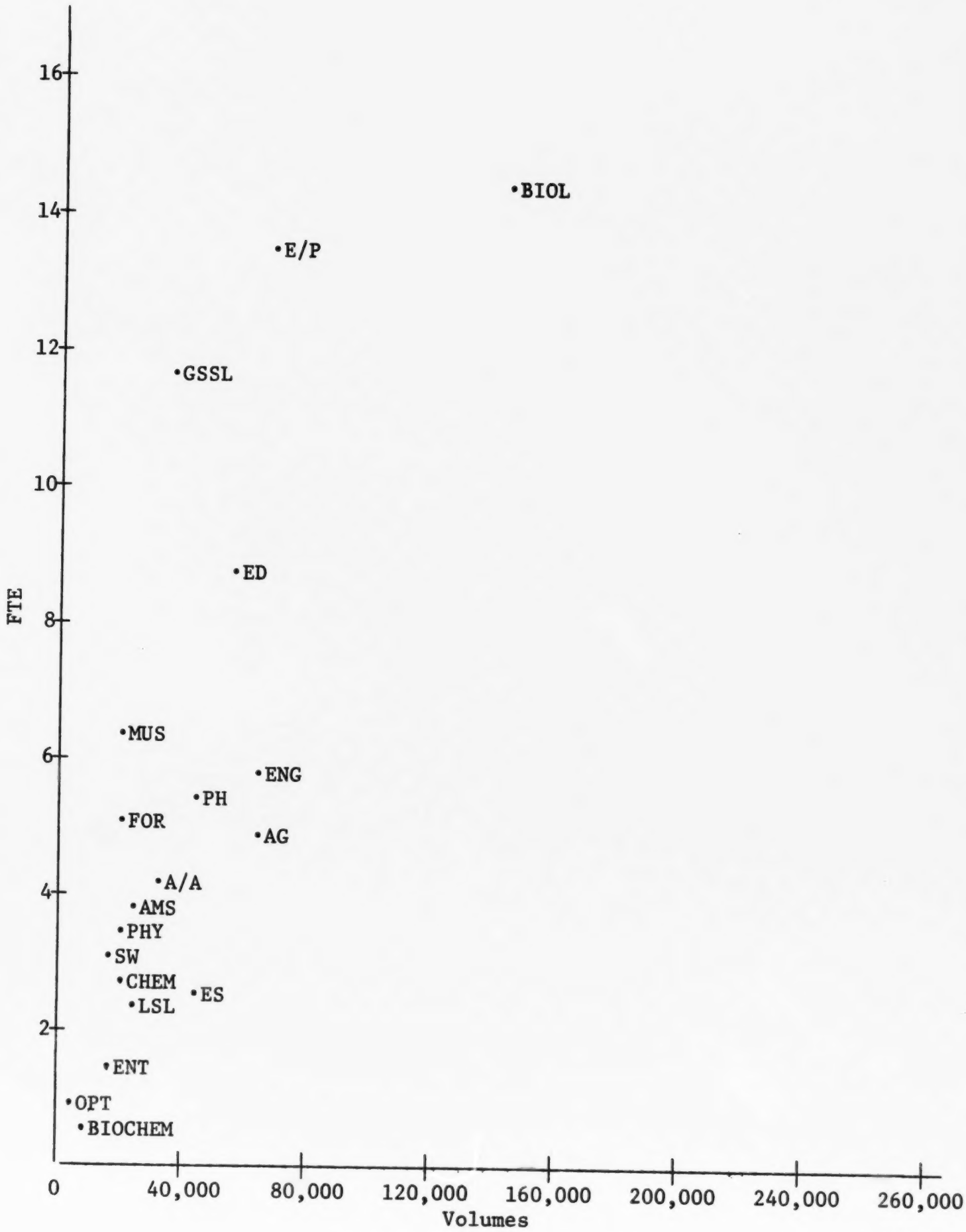

Figure 7: Volumes - FTE
Branch

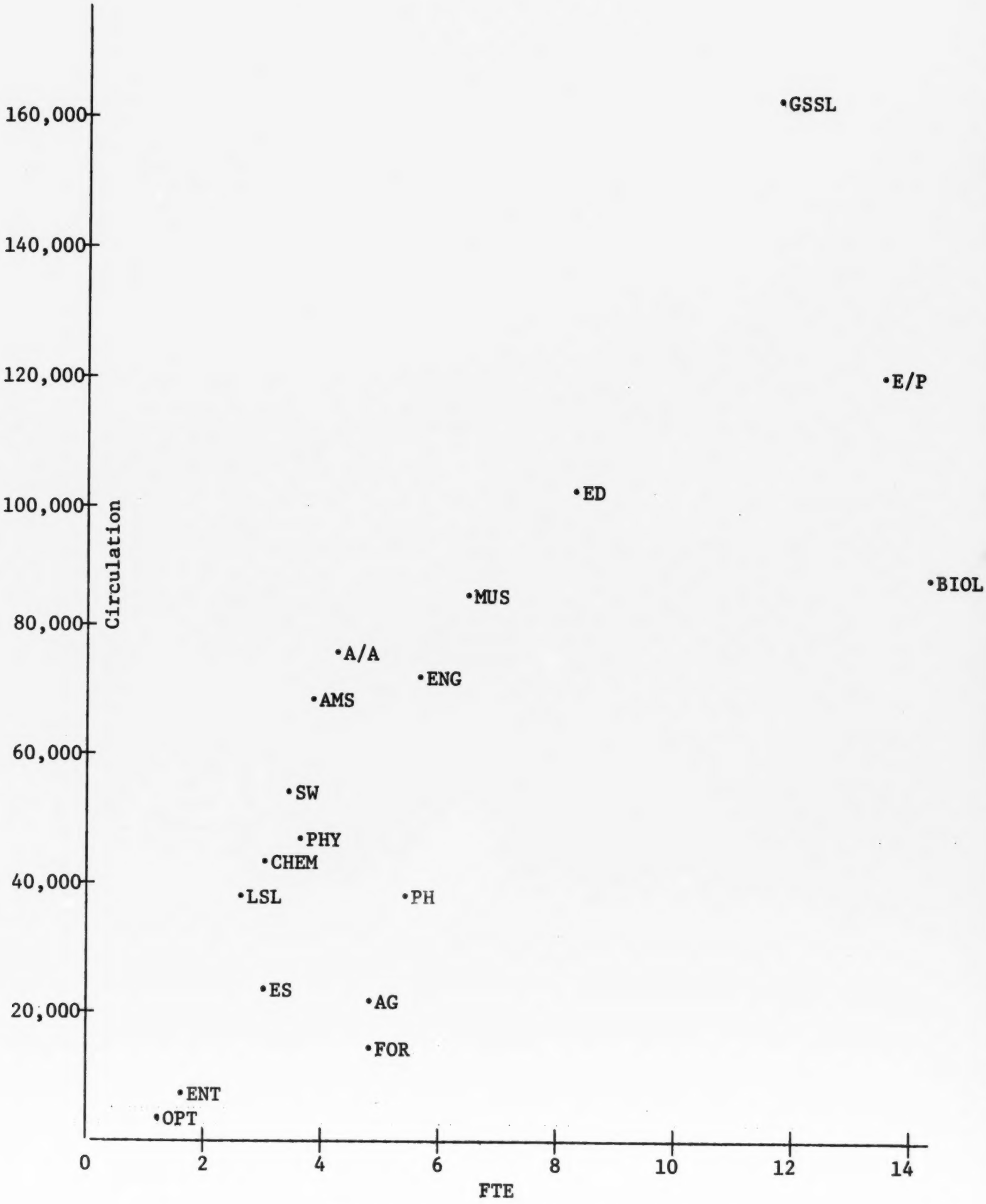

Figure 8 FTE - Circulation

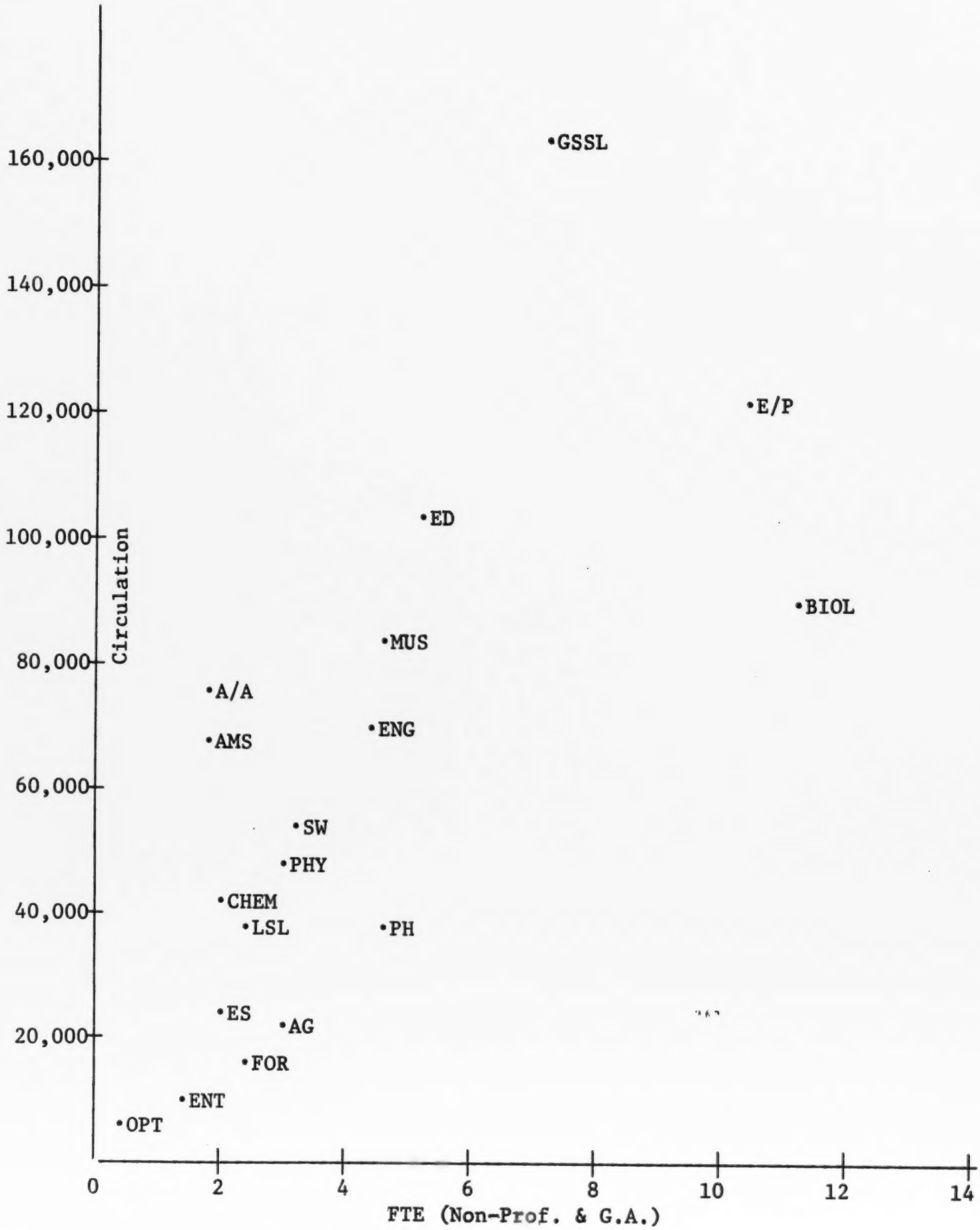

Figure 9: Non-Prof. & G.A. FTE - Circulation

The stack capacity (in square feet) for each of the branches is plotted against the total items held by that branch in Figure 10. From the graph it is apparent that the Chemistry and Graduate Social Sciences library have room for expansion while Art/Anthropology, Engineering and Music seem to be relatively crowded.

A particularly interesting relationship emerges when study space is displayed with circulation (Figure 11). A consistent pattern seems to exist between the two variables. As study space increases, circulation increases.

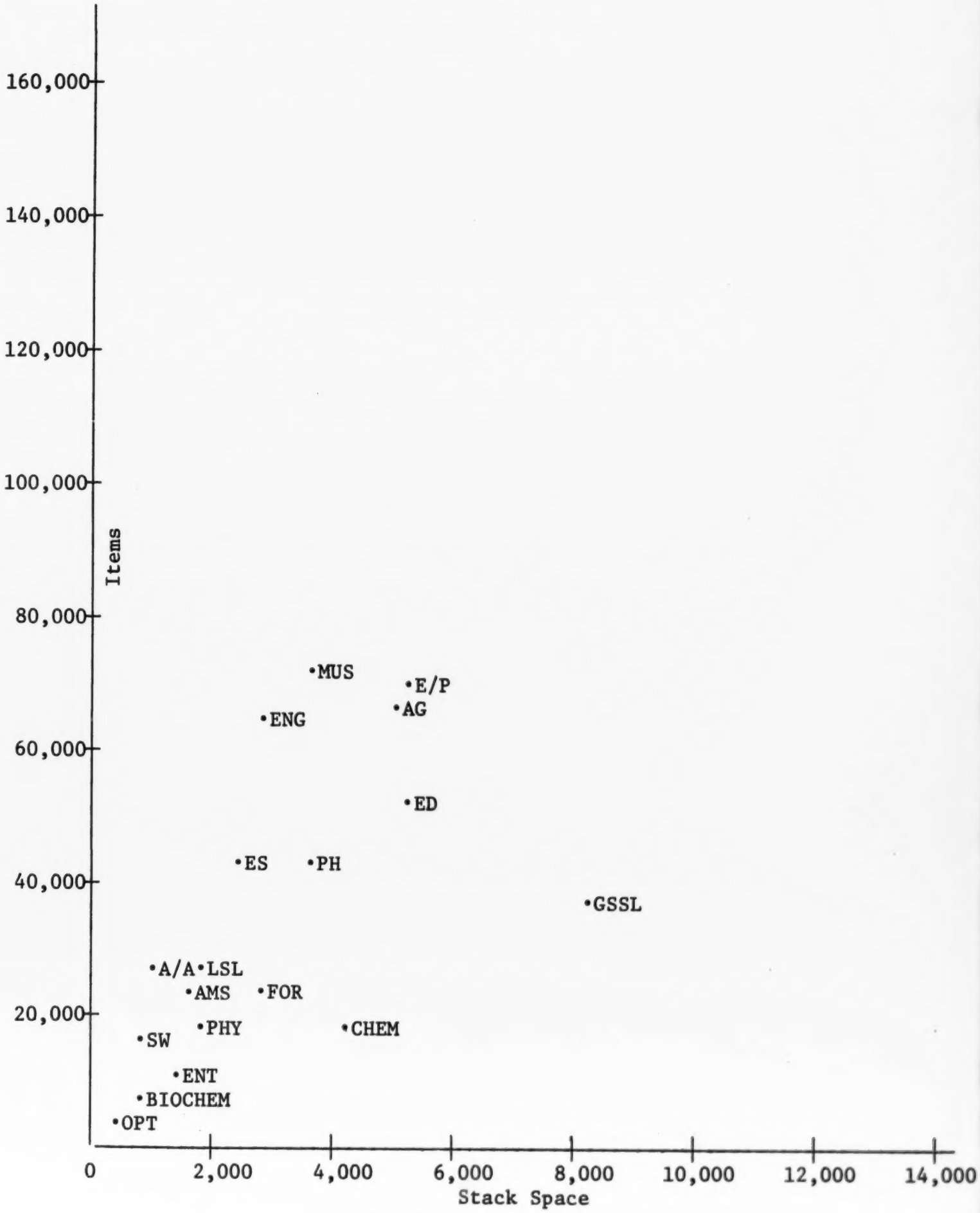

Figure 10 Stack Capacity

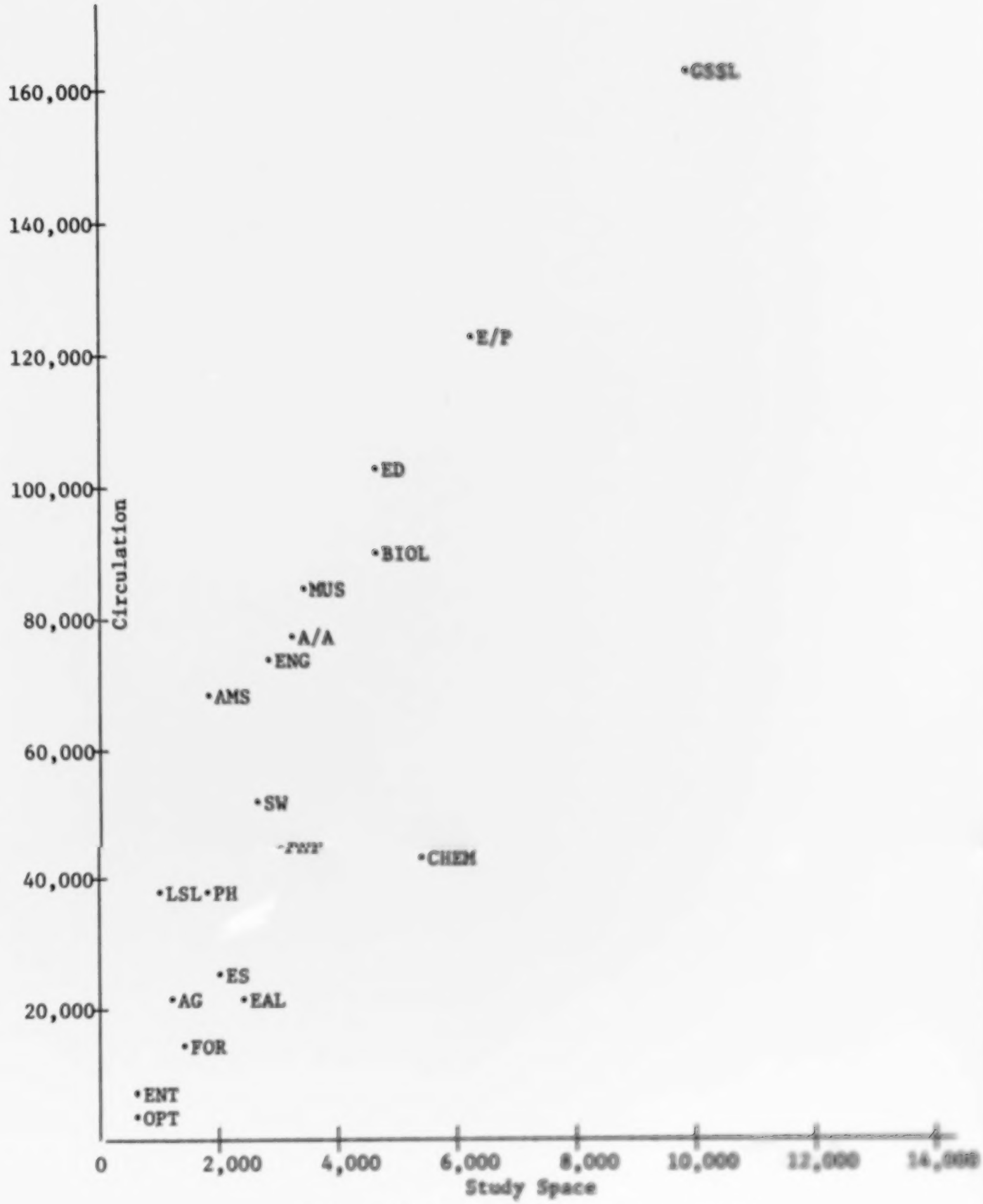

Figure 11: Study Space - Circulation

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